

# An ecological Survey of the larger Mammals of Peninsular India

BY

M. KRISHNAN

(With ten plates)

[Continued from Vol. 68 (3) : 555]

## THE TIGER

### *Panthera tigris* (Linnaeus)

(Summary of field notes : Observation records : 22, of which 18 were in the Kanha National Park, M.P., in May 1968, limited to 4 animals. Fresh pugs : 16. Other conclusive evidence of presence : 2.

*Locations* : Tamil Nadu—Mudumalai Sa. : Andhra Pradesh—Kawal Sa. ; Orissa—Balimela, Purnakote : Bihar—Hazaribagh N.P., Palamau N.P., the bed of the river Koel : Madhya Pradesh—Kanha N.P., Bara Naya Para : Uttar Pradesh—Corbett N.P.

*Photographs* : MP 4, MP 7, MP 9, MP 10, MP 11, MP 12 : B 11)

MORE has been written about the tiger than any other Indian animal but most of it has been about how to shoot it or, more often, how the author shot it ; there are even entirely anthropomorphic 'autobiographies' of it ! Some of the habits and reactions of the tiger have been observed and reported by hunters such as Jim Corbett, and a closer study of it made by Dunbar Brander : some of this information has been taken into account in Prater's book, and a scientific and meticulously observed account of the tigers in the Kanha N. P., Madhya Pradesh, is furnished in Schaller's THE DEER AND THE TIGER. A great deal of information is available on the tiger in all this literature.

### *Size : Morphological characters*

Adult size differs with individuals, but as a rule the male is considerably larger than the female. Dunbar Brander provides a factual and informed discussion of the size and weight attained by tigers. The ground colour varies from the off-white of the albinotic 'white' tigers of Rewa through ochre to burnt sienna, and the shoulders and head may be lighter than the body in ground colour ; the abdomen, chest,

chin, and insides of the limbs are also white in ground colour, as also a 'sun-spot' above the eye, and the ruff above the cheeks. The stripes are variable in number, colour and formation, even in adults from the same litter, and further the ground colour and stripe spacing varies somewhat with age; the stripes are solid and broad on the abdomen and the insides of the limbs (where the ground colour is white). The patch of white above each eye is marked with a varying pattern of black, but there is always a thin rim of white to the eyes; the black spots on either side of the lips, from which the moustachial vibrissae arise, coalesce into thin bars, and high up the chin (near the mouth) there are some small black spots. The hair on the inside of the ears is white, and on the dorsal aspect of each ear the colouring is black with a large, prominent, almost white spot in the centre.

Many observers have commented on the obliterative or cryptic pattern of the tiger's coat, which is said to blend perfectly with the streaky appearance of tall grass and small bushes. It is obvious that to have any significance in its life, such colouring must have one or both of two functions: it may be protective and help in not betraying the tiger to its enemies, or it may be assimilative and help in not betraying the tiger to its prey. Apart from men, the tiger's chief adversaries consist mainly of other tigers, and ticks and similar parasites, so that the first aspect of the matter need not be considered further. In considering the value of the tiger's seemingly assimilative colouring to its hunting, it should be remembered that the perceptions of the prey species are not dominated by colour-sensitive vision, as ours are, and are more versatile, that so far as is known their vision is monochromatic and that the tiger hunts at night. Although it is often abroad and occasionally hunts by day, its hunting is done mainly at night. After sunset, a different kind of optic perspicacity governs even our colour-sensitive vision, for colour is no longer appreciable; the ability to see clearly by low light levels, and to sense slight movements rather than static form becomes important. Further, like other cats, the tiger creeps upon its prey till near enough to attack in a rush, crouching low and taking advantage of every bit of cover, depending more on not being seen at all than on assimilative coloration—some observers, going by the lack of stealth of tigers at times in attacking tethered live baits, have overlooked the entirely artificial circumstances then obtaining.

The colouring of the tiger's coat is only a specific variation of a generic pattern, and it is in the leopard that such specific variation attains its most remarkable obliterative efficiency.

### *Distribution*

Within peninsular India, the tiger has long been known wherever there were tree forests, and an adequate source of water (which could

be quite small). Its present status (when in many of its former haunts it is now rare or locally extinct, and when in others its natural prey has been so depleted by hunting and trapping that its survival is endangered because in such localities it now constitutes a threat to cattle and men) strikingly illustrates the unpredictable consequences of interfering with the balance of nature, and also the fallacy of the theory that a little thinning of numbers for shikar will not affect a fast-breeding animal like the tiger. Within the past two decades, the tiger has declined so substantially, and even dramatically, in peninsular India that no reliable estimate of its numbers can be made, in view of the lack of dependable statistics, and it is difficult to make any firm statement on its present distribution in the peninsula, but it still seems to be there, in many of its former haunts, though conditions in those areas have changed considerably and may speed its further decline.

#### *Habits : Behaviour*

In the Kanha N.P., in the first 12 days of May 1968, 4 tigers (2 adult tigresses and 2 male subadults about a year old) were seen by day on 18 different occasions. The 2 male subadults were the cubs of the younger and smaller tigress, and one of them was considerably bulkier than the other, almost as big as his mother ; the older, richer-coloured and much larger tigress seen once was said to be the mother of the young tigress (MP 68 May 1, 3, 4, 5, 6, 7, 9, 11 p.m.—photographs MP 4, MP 7, MP 11).

Apparently this was a family party, living under somewhat artificial conditions, with the younger tigress and the 2 subadults tied to the area by the regular provision of buffalo baits over a long period. In these circumstances it is hardly worth the while drawing conclusions, from observation of them, on the daily activity cycle of tigers, hunting and feeding, reactions to men and similar behaviour, but in other matters, such as intraspecific communications, avoidance of heat and glare, and instinctive responses they were no doubt entirely natural. Further, the conditions under which this family party of three was induced to stay more or less within two square miles of the Kanha meadow, and the repercussions of the sustained provision of inducements, are interesting.

The tigers were active in the mornings till about 8 a.m. after feeding on the bait killed at night ; then they lay up in the undershrub of a wooded nullah or in tall grass. Everyday they were disturbed in such cover by visitors to the sanctuary on elephant back till about 11 a.m., but only retreated deeper into the cover or shifted higher up the wooded hillock besides the nullah, though resentment of such disturbance was evinced even by the subadult tigers. Apparently they slept or rested in shade till evening, when they were again on the move. Usually they



Krishnan : Mammals



*Above* : M. P. 1968 : KANHA N. P. : May 4 — a.m. : The larger of the two subadult tigers — MP. 4 ; *Below* : M. P. 1968 : KANHA N. P. : May 6 — a.m. : Portrait of the larger subadult tiger — MP. 7.

(Photos : M. Krishnan)



Krishnan : Mammals



*Above* : M. P. 1968 : KANHA N. P. : May 8 — a.m. : The tigress on the rock — MP. 9 ;  
*Below* : M. P. 1968 : KANHA N. P. : May 11 — a.m. : The tigress in the corridor between  
the bole of the banyan and a pillar root — MP. 10.

(Photos : M. Krishnan)



did not stay together, the 2 young tigers staying near each other, or one in the nullah and the other in the wooded hillock, and the tigress choosing different retreats not too far away. The heat and glare were fierce, and once the tigress was located deep inside a cool, dark cave ; twice she was seen cooling herself in rock-girt pools (MP 68 May 10 & 12 : photograph MP 12).

In May 1968, only this group of 3 (the smaller tigress and her 2 yearling cubs) were killing the baits provided, and had been accustomed to do so over a period of months. Evidently what had originally attracted the tigress to the area was the need to provide for growing cubs coupled with the assured availability of easy, staked-out prey. It was said that the larger tigress (the reputed mother of the smaller) had visited the kills once or twice. There was another tiger in the forests beyond the Kanha meadow, a large male, but he did not come to the kill.

Once I found the smaller tigress lying up in a tussock of tall grass, and at our approach (on elephant back) she entered an extensive patch of tall grass across a forest road and proceeded, hidden by the cover, to where the larger tigress was lying up, about 100 yards away. Approaching the larger tigress, she came out with repeated low, vibrant, whining calls, reminiscent of the call used by a chained-up hound wishing to attract the attention of a man—these, evidently, were placatory, and the two tigresses were on amicable terms (MP 68 May 11 : photograph MP 11).

Although accustomed over months to being photographed and watched at night from the elevated, covered hide, while feeding with her cubs on the kill, and to being followed by visitors to the park on elephant back in the mornings, this group of tigers had not developed that indifference to human proximity that lions in similar circumstances develop, but were tense and resentful.

Schaller, analysing the reports of others and his own observation of the social interactions of adult tigers, says these are best understood in the three separate contexts of hunting, mating and feeding : he concludes that usually tigers hunt alone, that rival males attracted to a receptive female are antagonistic to one another, and that they ' appear to socialize more at kills than any other occasion '. He cites 3 detailed personal observation records in support of this, and it is noteworthy that in all of them the kill was by one particular tigress with 4 cubs, that the prey killed was domestic cattle, and that the tiger, and the 2 other tigresses, that were allowed to feed on these kills were, presumably, previously known to the tigress with 4 cubs. He further records that while the behaviour of this tigress was friendly towards the tiger, her acceptance of the other 2 tigresses at the kill was hostile ; it is interesting to note that superior size did not determine commensal priority, but that the ' owner ' of the kill seemed to have precedence.



There are many other instances, recorded by earlier observers, of 2 or more tigers feeding at the same kill, but as far as can be ascertained those tigers had previously accepted one another, and in many instances were closely associated.

Undoubtedly the findings of Schaller, Dunbar Brander and others, with regard to the sociability of tigers at kills, are entirely valid, but such records of commensal amiability, or unwilling mutual tolerance, do not exhaust the scope of this particular context, nor are the three contexts mentioned above the only main contexts of adult intraspecific interactions among tigers. There are records of tigers having appropriated the kills of others, and such appropriations were not, obviously, amiably permitted. Further, in commenting on the sharing of territory by tigers, Schaller points out that once social dominance is established, in further encounters fights are avoided by the mutual acceptance of dominant or submissive behaviouristic expressions. In no animal is such acceptance immutable or unconditional. Other factors may condition such armed neutrality, such as the size and food-appeal of a kill, maternal instinct, or even emotional states. Sex also has to be considered. A tigress may not fight a tiger, but may resent the intrusion of another tigress into the area.

Moreover, artificial inducements and influences sometimes lead to internecine fights. In May 1968 I made diligent inquiry of the park officials at Kanha, and learnt that a few months previously another tigress, with one cub, was known in the area, but that she had been killed in a conjoint attack by the two adult tigresses I had seen (the mother of the yearlings, and her mother), in the very nullah occupied by the family party of three that I was observing. There was no reason for doubting the truth of this statement. I heard it from 4 different sources, two of them had actually seen the carcass of the dead tigress and the footprints and blood marks at the scene of the killing. Nothing was known of the fate of the cub with this tigress. Later in the same month, at the Corbett N.P. of Uttar Pradesh, where also baits were regularly tied out to attract tigers to the Dhikala area so as to display them to visitors, I learnt that a tiger had been killed in an intraspecific fight. In March 1969 no tiger was taking the baits staked out at Schaller Tower, Kanha, though I believe there were one or two kills when the baits were tied in different localities: only one set of fresh pugs were seen, of a tigress (MP 69 Mar. 10). There was a report of another tiger having been killed in an intraspecific fight since my previous visit, but no inquiry was possible. In March 1970, no tigers were taking any baits in the Kanha park: apparently no tigress with cubs had been attracted to the area.

Writing of the tiger's might eighteen centuries ago, the Tamil poet Paranar said that it was so powerful that it could kill and carry a bullock.



Krishnan : Mammals

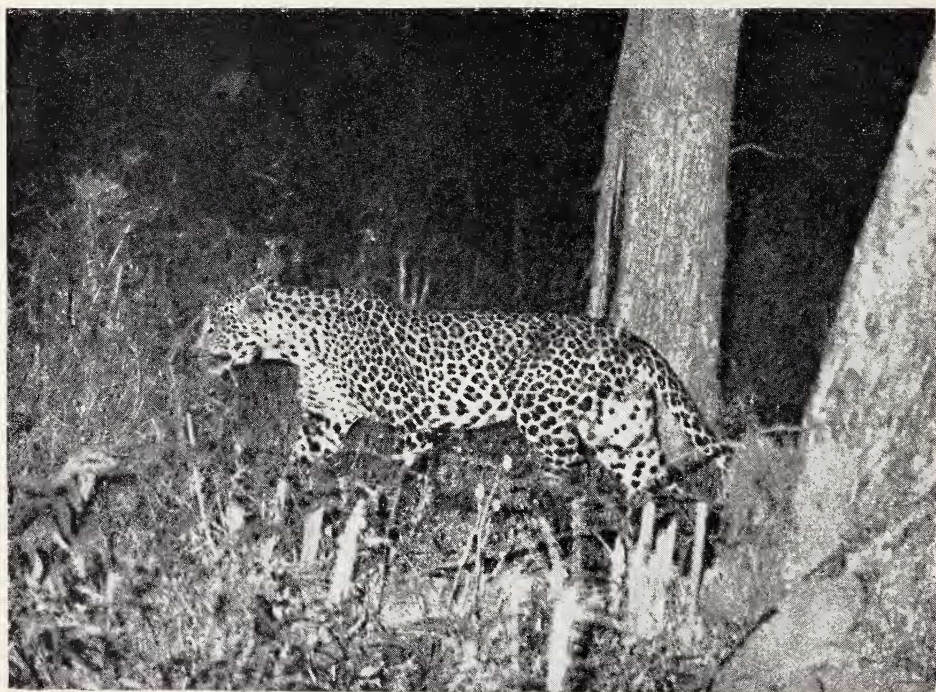


*Above* : M. P. 1968 : KANHA N. P. : May 11 — p.m. : 'Bade Ma' — MP. 11 ; *Below* :  
M. P. 1968 : KANHA N. P. : May 12 — a.m. : The tigress in a pool — MP. 12.

(Photos : M. Krishnan)



Krishnan : Mammals



*Above* : BIHAR 1969 : BETLA : PALAMAU : February 17 — p.m. : Adult gaur cow killed by a tiger — B. 11 ; *Below* : MAHARASHTRA 1968 : TAROBA N. P. : November 25 — about 7 p.m. : A big male leopard — MR. 6.

(Photos : M. Krishnan)

Schaller records a tiger killing an adult bull gaur in the Kanha park, a much more impressive performance. I saw the freshly-killed carcass of an adult gaur cow in the Palamau N.P., killed single-handed by an adult male tiger well known in the area : the tracks showed where the tiger had attacked the cow, in tree forest, and later dragged the kill down a decline to the middle of a stony, open nullah where he had abandoned it, with no attempt to cover it : he did not return to the kill, which was lying close to a forest road. The remarkable feature of this kill (which was inspected by several others, besides me) was that there were no claw marks on the gaur's hide, and that the only wounds were two sets of two deep, punctured wounds, inflicted by the canines, on either side of the nape ; the throat had not been bitten (B 69 Feb. 17 : photograph B 11).

S. R. Choudhury of the Orissa Forest Department related a quite remarkable instance of a tiger's self-assurance in making a kill, to which he had been an eye-witness. He was watching a line of elephants slowly going up a forested hill along a narrow ledge, from far away, when a tiger suddenly leaped on to the ledge from bush cover, made a lightning pass at a young calf, and retreated into cover before the excited adult elephants could intervene ; the attack was said to have lasted only a few seconds. The infant collapsed and later died, and after a long while the elephants, including the mother of the calf, left the carcass and went up the hill. I saw an interesting set of fresh footprints on the bed of the Koel, showing how a tiger had followed a party of elephants (which included an infant) part of the way across the dry river bed (B 68 Apr. 23). In the Palamau N.P., at Hathbajhwa, I heard a tiger growling from the dense cover behind the watch-tower, from which a young elephant calf had emerged, and saw a number of adult elephants entering the cover, presumably to investigate (B 69 Feb. 19, 4 p.m.).

Tigers will drink from a small, muddy puddle at times, when a river or pool is available not too far away, as noticed in the Mudumalai Sa. and also in Palamau N.P. (B 68 Apr. 27). The tigress observed in Kanha in 1968 was very sleepy by about noon, after feeding on the kill at night, but evidently mistrustful of reclining on the ground when men on elephant back were close by. Thrice, she left the tall grass cover in which she had been lying up when approached, and walked towards a boulder-strewn part of the forest about two furlongs away. On the first occasion, she stopped frequently to urinate, roll on her back, and lie down once briefly on a bare patch, in what seemed displacement activity ; then she went on to a rounded rock about 9-foot high and climbing it, stretched herself on top, in the shade of a young banyan that grew there : she watched us sleepily as the riding elephant slowly approached the rock and halted 30 feet from her, then her eyes closed partially as she rested her chin on her paws, still facing us. In



another minute she was sound asleep, turning her body over on one side to relax fully. On the other two occasions she went to another rock nearby, also about 9-foot high, also with a banyan tree shading it, but growing on top with pillar roots close by the trunk : she ensconced herself in the corridor between bole and pillar, stretched flat on her stomach, and watched our approach from half-closed sleep-heavy eyes : as she watched us, her eyes closed to mere slits, her raised head began to nod, and finally dropped on to her paws, and she was asleep. This was no passive form of displacement behaviour, it was sleep all right, authentic, compulsive somnolence, probably induced by heavy feeding. Seated on the elephant, I was on a level with her and was able, by slowly backing the elephant (the approach was intentionally made with the head of the elephant turned away from the rock) closer in by degrees, to get near, on one occasion getting as close as 12 feet from her nose by accurate rangefinder measurement.

She slept, so to speak, with eyes shut tight and ears wide open. Fairly rapid movements of my hands and body, the sounds made by the release and resetting of the camera's shutter and the winding on of the film, my directions to the mahout in a low tone and, later, even my whistling to make her look up, failed entirely to rouse her. I was positively anxious not to do anything that might panic her, as the impossibly contrasty lighting, with the overhead sun casting patches of dense shade and brilliant highlights all over, presented quite sufficient photographic problems without the added one of the subject bolting. However, in an attempt to get her to raise her head and open her eyes fully, loud clucks with the tongue were tried, to no effect. Everytime the elephant was moved, the noise of its feet on the litter-strewn ground made her open her eyes partially, for visual confirmation of her hearing, and I was able to get her to raise her head and stare sleepily only by making the elephant shuffle feet without moving. Her judgment of our position by ear alone was remarkable (MP 68 May 8, 10, 11 : photographs MP 9, MP 10—other photographs, showing this tigress with the head resting on her paws or on the rock, and the eyes closed or partly open, have not been printed for this report).

Besides vocalisations (of which Schaller provides a succinct account) variations in attitudes and deportment seem to play an important part in intraspecific communications, as in other cats. The staring ear-spot seems to serve as a flag only when the ears are pricked and seen from behind the tiger.

## THE LEOPARD

*Panthera pardus* (Linnaeus)

(Summary of field notes : Observation records : 13. Fresh pugs and other conclusive evidence of presence : 7.

*Locations* : Tamil Nadu—Mudumalai Sa. : Orissa—Simlipal hills : Maharashtra—Taroba N.P.

*Photograph* : MR 6.)

Widely recognised as the most variable of the greater cats morphologically, at one time there was a distinction between a larger panther and a smaller leopard, but now it is realised that they represent only individual and ontogenetic variations of the same species. Currently, there is a revival of taxonomic interest in possible regional races, even within peninsular India. The black leopard is only a melanistic variation, generally found in the denser and more evergreen forests ; its reported smaller size seems entirely due to its much darker ' whole ' colour.

*Size : Morphological characters*

Adult size varies widely, from near 6-foot (between pugs) to 8 feet, but this gives a poorer indication of size than weight, as the length of the tail has no relation to body size. Weights vary from 60 to 160 lb. These variations are not regional. In personally verified records of the length (between pugs), weight, and pelage patterning of 14 leopards shot (by others) in the same area of the Deccan during the forties, the following are included :

1. Adult male, 6' 1" long ; weight 64 lb. The coat was short, smooth, and very richly patterned with close-set jet-black spots and rosettes on a fulvous burnt sienna ground, with the ground colour of the abdomen, chest, chin, the sides of the jaws, the inner aspects of the limbs and the distal part of the long tail conspicuously white.
2. A male in his prime, 7' 7" long ; weight 158 lb. The abdomen was tucked in, and when cut up the stomach was empty ; when gorged this animal would have turned the scales at close on 170 lb. The coat was raw sienna in ground colour, with the chin, a small ruff, the chest, abdomen and the insides of the limbs off-white, and black spots and small rosettes.
3. An old male, heavily built and with a domed head. Mistaken for a tiger in the evening light. Length 7' 1", tail 32" ; weight 132 lb. The extraordinary feature of this animal was that the chin, chest and abdomen were a light yellow ochre, even the hair inside the ears. The body colour was a deep, dull ochre and the spots and rosettes indistinct against the ground colour, being a graphite-grey rather than black. Coat short and close.
4. An old male, 7' 7" long ; weight 121 lb. Head small. Coat furry, tail long and furry. Ground colour of body a pale fulvous grey. Spots small and few, even along the median line of the back ; many double



rosettes, with the inner circle consisting of spots and the outer not heavily marked but delicately pencilled.

The ear-spots are present, as in the tiger, but much less noticeable, perhaps because of the spotted coat.

### *Distribution*

It has often been said of the leopard that (even within peninsular India) it has a much wider distribution than the tiger, being much smaller, more versatile in its hunting, more tolerant of the heat and less demanding in its requirements of cover, being well able to thrive in open country, in rocky hills and thorn-scrub.

That was the position 25 years ago. In the recent past the leopard has declined notably in open country and around human settlements in peninsular India, partly owing to the conversion of scrub to human uses and partly to having been shot out and poisoned. It is now to be found mainly in certain favoured localities, such as sanctuaries, and is almost or completely rare in many locations where it was common formerly.

### *Habits : Behaviour*

The literature on the leopard as a big game animal is extensive and contains much evidence on its unpredictable variability, but meagre in circumstantial accounts of its habits. A male and a female are sometimes seen in a pair, as also a leopardess with young cubs, but the period of association between cubs and mother seems shorter than in the tiger ; perhaps the cubs grow up faster.

The size of its prey depends, naturally, on the size of the leopard. It is generally agreed that sambar stags and bull nilgai are left alone by leopards, but at Chilkanahatti (in Mysore State at present) a big leopard killed a bullock. Subadult and young sambar and nilgai are no doubt preyed upon, as also young gaur calves if they can be safely attacked. A leopard is not able to kill even a goat quickly, with a blow of its paw or one bite, as tigers do at times, and therefore it has to study safety in attacking the young of large animals. A small leopard on a fallen tree trunk was seen closely watching a herd of gaur in which there were 3 young calves ; seeing me (on elephant back) the leopard dropped into the grass below and seeing it, two gaur cows rushed towards it with lowered horns and the leopard bolted (TN 62 April 7, p.m.). On another occasion, 3 gaur cows topping a rise saw a big male leopard ascending the rise from the other side, and after a momentary halt and sharp, nasal snorts, rushed at the leopard with lowered heads and the leopard bolted (TN 59 Mar. 22, a.m.). In both instances, the gaur rushed at the leopard at a fast walk, not a gallop.

A small adult female, followed at a distance on elephant back, urinated repeatedly, rolled on her back on the ground with all four feet

in the air, and when moving fast, melted into a grey blur (TN 63 Mar. 19, p.m.). The almost completely obliterative disruptive colouring of a leopard in tangled tall grass or thorn-scrub has been remarked upon by many observers, and is no doubt of value to an animal that is abroad so much by daylight (TN 63 Mar. 25, a.m.) ; however the remarkably disruptive effect of the coat when the animal is moving fast has not received the attention it merits ; unlike a tiger, a leopard crossing even open ground at a fast pace is difficult to follow visually, because the effect of movement is to create, not a grey form with contour sharpness, but a grey blur. I have noticed this both by daylight and by artificial light (spotlight) at night—the only other Indian animal that also gets blurred by movement is the porcupine, but that is no doubt achieved in part by the outbristling of the quills, and anyway is much less obliterative. This is perhaps of some value to the leopard in its getaway from large animals chasing it, such as gaur and tiger.

When moving away from men, or other animals such as gaur or elephants, leopards run or slink into bush cover or into tall grass, and often squat low in the cover, but are said to climb trees when a tiger is near or wild dogs on their trail. Tigers are their chief natural enemies ; many instances of wild dogs chasing leopards are on record. Occasionally, a leopard may seize a wild dog—I have heard of such an instance.

A very full account of the varied prey on which leopards subsist is provided by Dunbar Brander in his book. When hunting monkeys they sometimes climb trees, apparently to scare the prey into leaving the tree and seeking escape across the forest floor, when it can be seized : sometimes they hunt monkeys in a pair.

It is said that leopards are much less dependent on water than tigers. They do not lie up in water as tigers do, but drink regularly, particularly after feeding. As in the case of the tiger, a small water-hole or puddle will suffice for them, and in saying they can do without water, the human observers have apparently missed such inconspicuous sources.

Langur, macaques, barking deer, chousingha, chital, sambar and a number of birds (including the peafowl) sound alarm calls at the sight of a leopard, as at the sight of a tiger. Both the giant squirrel and the common striped squirrel also call at a leopard, the former in a more urgent variation of its normal rattling call, and the latter in an excited, sustained chirrup.

Unlike young tiger cubs, leopard cubs are highly vocal at times, till about 2 months old. Their call then is a repeated, plangent, long-drawn, rasping mew, and presumably addressed to their mother when she is not in sight, for it is not sounded when she is at hand. The grunt and snarl of the adult, as well as the peculiar call reminiscent of the thrust and return of a wood-cutting saw, are well-known.

The leopard's addiction to spitting and hissing like a wild cat, when



expressing resentment (as when demonstrating at men) should be mentioned (TN 63 Mar. 25, 69 Oct. 3).

Leopards seem even more prone to residence within a limited range, when their requirements are met locally, than tigers.

## THE JUNGLE CAT

### *Felis chaus* (Güldenstaedt)

(Summary of field notes : Observation records : 22.

*Locations* : Tamil Nadu—Mudumalai Sa. : Orissa—Badrama : Bihar—Hazaribagh N.P., Palamau N.P., Karkatnagar : Madhya Pradesh—Kanha : Maharashtra—Taroba N.P.

*Photograph* : B 9.)

Domestic cats, run wild, are not uncommon in the scrub and forests around human settlements. Where there is some white or patterned stripes on the coat, these are easily told apart from the jungle cat, but the larger size of the latter, as specified in faunal literature, does not appear to be a reliable criterion for distinguishing between the two. In the identical location (for instance, the Hazaribagh N.P., Bihar) the animal is to be found of the stature and coloration of textbook descriptions, and also of the same colour but only about half the size of the larger animal, and these smaller specimens, closely observed, were seen to be quite adult. Inquiry of others likely to know about the possibility of hybrids between the feral domestic cats of India and authentic *Felis chaus* have yielded no definite information—the coloration of these smaller-sized Jungle Cats is substantially the same as that provided in faunas, except that there seems to be a greater admixture of brick red in the grey than in the descriptions, especially in the Taroba N.P. of Maharashtra. There is some variation in size even among the smaller animals seen, some being only the size of a big domestic tom (approximately 5-6 lb. in weight) and others somewhat larger. All cats seen in the forest of a general predominantly fulvous or reddish grey colour with no dark markings on the flanks, with the tail short and ending in a dark tip with a few rings above the tip, and pointed ears, edged with black or dark grey, have been taken as Jungle Cats in this report. (MR 68 Nov. 19, 20, 21, 24 ; B 69 Feb. 20, 70 Feb. 23 ; TN 70 Oct. 3).

### *Size : Morphological characters*

Variations in size have already been mentioned. Some large specimens, of the size specified in faunas, were also seen (B 69 Feb. 14 : photograph B 9). In specimens seen, a dark line running down from the inner lower corner of each eye down to the nose (on either side) was observed. In subadults, there were dark bars on the inner aspects

Krishnan : Mammals



*Above* : BIHAR 1969 : HAZARIBAGH N. P. : February 14 — 8.30 p.m. : Jungle cat — B. 9 ; *Below* : BIHAR 1970 : HAZARIBAGH N. P. : February 4 — about 8.30 p.m. : Hyena — B. 23.

(Photos : M. Krishnan)



Krishnan : Mammals



*Above* : KERALA 1970 : PERIYAR SA. : May 6 — a.m. : Wild dog — K. 28 ; *Below* :  
MYSORE 1968 : BANDIPUR SA. : October 22 — a.m. : Wild dogs — MY. 11.

(Photos : M. Krishnan)

of the upper half of the forelimbs and on the abdomen (B 69 Feb. 21 & 22, 70 Feb. 26).

### *Distribution*

Throughout peninsular India, in open forests and scrub.

### *Habits : Behaviour*

On occasion a cat was seen to pounce on something small on the forest floor, and to crunch it up, most probably a grasshopper or similar insect. 4 adults were seen crouched immobile in the open, near water, and in a bush near an artificial salt lick, evidently lying in wait for partridges, doves and other birds visiting the water and lick (B 68 Apr. 26, 69 Feb. 20, 70 Feb. 23, 70 Feb. 27 ; TN 64 Sept. 27, 70 Oct. 3 & 4).

Grown kittens were seen in the Palamau N.P., Bihar, in February 1969 and 1970.

## THE SMALL INDIAN CIVET

### *Viverricula indica* (Desmarest)

(Summary of field notes : Observation records : 18.

*Locations* : Tamil Nadu—Mudumalai Sa. : Orissa—Badrama, Simlipal  
Hills : Bihar—Hazaribagh, N.P. : Maharashtra—Taroba N.P.

No photograph.)

This is the common civet of peninsular India and mainly nocturnal.

### *Size : Morphological characters*

Larger than the Common Mongoose, standing higher, and heavier-built. Length about 3 feet. Weight around 6 lb.

### *Distribution*

All over the peninsula, in open deciduous forests and scrub jungles ; common around villages.

### *Habits : Behaviour*

This civet was seen alongside forest roads at night, usually singly. A pair (probably mother and near-adult young) was twice seen on the periphery of the Taroba lake (MR 69 Nov. 20, 25). Although it climbs trees, it was always seen on the ground. In addition to feeding on small animals, berries and the like, it preys on insects, like beetles and grasshoppers.

This civet has an interesting history in the Deccan, where, till about 30 years ago, it was often tamed and given the run of the house, being an excellent rat-ter. The perfume, civet, is extracted from it, and formerly it was much valued as the provider of it, but for that purpose it



was kept closely caged, the civet being rubbed off on the bars of the cage from its sub-caudal scent-glands, and scraped and collected.

### THE COMMON PALM CIVET

*Paradoxurus hermaphroditus* (Pallas)

(Summary of field notes : Observation records : 7.

*Locations* : Bihar—Palamau N.P. : Madhya Pradesh—Shivpuri N.P. :  
Maharashtra—Taroba N.P.

No photograph.)

The 'toddy cat', so called from its tendency to drink the sweet juice from the pots of toddy-tappers (the name 'palm civet' has much the same derivation), is a much more arboreal animal than the civet, though it also hunts prey on the ground. It is nocturnal, like the civet.

#### *Size : Morphological characters*

About 3-foot 6-inch to 4 feet long, and around 8 lb. in weight. It is a low-to-ground creature that seems larger than it is because of its long, coarse, dark hair.

#### *Distribution*

All over the forest and scrub areas of the peninsula : not uncommon in urban areas.

#### *Habits : Behaviour*

The palm civet, like the civet, lives on small animals (including insects) and fruits, but finds its prey as often up a tree as on the ground : it preys on birds and raids their nests. In urban areas, rats seem to be its main prey. For years an untamed palm civet shared my tiled cottage and unkempt garden with me, and I have seen it hunting palm squirrels on my roof at night.

It is often found inside tree forests (MP 69 Mar. 31 ; MR 68 Nov. 21 ; 69 Nov. 25, 29 ; B 70 Feb. 21).

The eyes of few mammals reflect artificial light beams at night (such as a spotlight) as brilliantly as the palm civet's.

### THE COMMON MONGOOSE

*Herpestes edwardsi* (Geoffroy)

(Summary of field notes : Observation records : 20.

*Locations* : Tamil Nadu—Mudumalai Sa., Pt. Calimere Sa. : Mysore—  
Bandipur Sa. : Bihar—Palamau N.P., Karkatnagar : Madhya Pradesh—  
Bastar : Maharashtra—Taroba N.P.

No photograph.)

The Common Mongoose is one of the few wild animals of India that most people know, in a somewhat anthropomorphic way as the killer of cobras. I have not seen a really big mongoose with a snake-charmer.

*Size : Morphological characters*

The male is larger than the female. The average length of an adult is 3 feet ; weight 3-4 lb.

*Distribution*

This mongoose is common all over the peninsula, and is essentially an animal of the open scrub.

*Habits : Behaviour*

This mongoose appears to be mainly diurnal. Wild mongooses were seen moving actively at all times of the day, even during the hottest hours. It is unreliable going by the activity cycle of tame animals, fed regularly, but most of the hunting seems to be done in the mornings and evenings. However, mongooses are met by night as well (MR 68 Nov. 19) : family parties of a mother followed by 3 or 4 young in a train, are usually crepuscular.

The mongoose is essentially a hunter, but its diet is varied with berries and other fruits, and it eats beetles, grasshoppers, birds and their eggs, lizards, snakes and frogs, as also small mammals like rats and mice. I have personally known it to kill a hare bigger than itself, and once saw a big mongoose carrying a fair-sized bird that looked like a stone-plover, considering the surroundings more probably a stone curlew (*Burhinus oedicnemus*)—MY 68 Oct. 19. At Point Calimere I noticed, shortly after dawn, numerous mongoose tracks leading from the littoral scrub to the foreshore and meandering along it, suggesting that crab-hunting at night was indulged in.

## THE STRIPENECKED MONGOOSE

*Herpestes vitticollis* (Bennett)

(Summary of field notes : Observation records : 6.

*Locations* : Tamil Nadu—Mudumalai Sa.

No photograph.)

This large mongoose attains an almost otter-like thickness on occasion, though it is much smaller in proportion.

*Size : Morphological characters*

Much heavier than the Common Mongoose, though only about the same length (3 feet). Prater gives the weight at 7 lb. In the same area,



some animals are much darker (TN 63 Mar. 17) : the distinctive stripe on the neck is visible in a good light even in such animals.

### *Distribution*

Along the Western Ghats, in deciduous forests. In these, it is usually seen in swampy clearings, along watercourses, and in open scrub, though it certainly does enter tree forests also.

### *Habits : Behaviour*

Although it hunts small prey, like insects and frogs, it also preys on animals as large as itself or larger. A striped-necked mongoose was seen chasing a young chital fawn in the scrub (TN 70 Sep. 20). A captive specimen I know was fond of bananas. A certain amount of vegetable food is also taken.

## THE STRIPED HYENA

### *Hyaena hyaena* (Linnaeus)

(Summary of field notes : Observation records : 4.

Spoor and call : 2.

*Locations* : Tamil Nadu—Mudumalai Sa. : Orissa—Simlipal hills, near Sambalpur : Bihar—Hazaribagh N.P., Palamau N.P.

*Photograph* : B 23.)

Prior to the period of this survey, I have seen the hyena now and again in fairly open forests interspersed with scrub. Very few were seen in the forested areas in which most of the work was done after 1959, but no doubt they were there. Being mainly nocturnal, and going about in a pair or by themselves, they are seen seldom, and then only by chance, in the course of night drives along forest roads. No attempt was made during the survey period to locate and observe hyenas.

### *Size : Morphological characters*

The enormously powerful, bone-cracking jaws, the fall off to weak-seeming hind quarters and legs from the strong forequarters, and the dorsal crest of thick, long, fine hair are the main physical attributes of the hyena. Prater gives the height at the shoulder at 3 feet, and a weight of 85 lb. for a male. The spoor is unmistakable, with the imprint of the big forefeet so much bigger than that of the compact hind feet.

### *Distribution*

The striped hyena has a wide distribution in Asia, and Africa. In peninsular India it is found both in forests, and more commonly in rocky, ravine-cut, bush-clad country.

*Habits : Behaviour*

Well known as a carrion eater and as a feeder off the kills of other animals, the striped hyena in India has not received the serious attention of naturalists. There are records of its appropriating a leopard's kill, driving off the legitimate owner of the kill—these are interesting, in that a fair-sized leopard may kill a big dog the size of a hyena, and suggest that the hyena does put its great jaw-power to aggressive or defensive use on occasion. There are also records of its carrying away dogs, and occasionally, infant animals and even children. As against this when hunted with dogs it has been known to sham dead instead of fighting its way clear, enduring the worrying and the bites of its hunters. Col. R. W. Burton assured me that taken young and tamed, it is quite dog-like in its attitude to men. Zoo specimens often get quite attached to their keepers, and others they know.

The vocalisation associated with the hyena is its discordant, cackling 'laughter', which seems to be indulged in when it is excited. It also comes out with a high, nasal whine that tails off to a whimper, similar to the whine of a dog 'calling' a man, when trying to attract attention. In 1955, a hyena in the People's Park at Madras was deeply attached to the late B. V. Ramanjulu, who was then the Superintendent of the zoo. On several occasions I have been a witness to this hyena scenting him, when he was invisible to it, and calling to him with loud whines, which would change to a staccato cackling when he came up and stroked it. Hyenas have a very fine nose.

Another sound commonly used by a pair out on a prowl, and separated from each other by a short distance, is a high, querulous 'kow', somewhat long-drawn and declining in volume. I investigated this call, often heard at night along a stony nullah near Krishna Nagar in Sandur (now in Mysore State) and on two occasions was able to observe the hyena calling: the call was answered by its mate, from about a furlong away.

## THE JACKAL

### *Canis aureus* (Linnaeus)

(Summary of field notes : Observation records : 25.

*Locations* : Tamil Nadu—Mudumalai Sa., Pt. Calimere : Andhra Pradesh—Pakhal Sa. : Orissa—Tickerpara, Simlipal hills, Chilka : Bihar—Hazaribagh N.P., Palamau N.P. : Maharashtra—Taroba N.P.

No photograph.)

No attempt was made to locate and study jackals specifically during the period of this survey, but prior to it and in rural localities, I have had opportunities to watch them closely.



*Size : Morphological characters*

Prater gives the height as from 15-17 inches and the weight as from 17-25 lb., and adds that animals from North India are larger and heavier. Perhaps he means the sub-Himalayan areas, but neither in the northern parts of peninsular India nor even in U.P., north Bengal (near Bhutan) and Assam were the jackals seen noticeably larger than in the South. The largest jackals I have seen were in the Pulneys.

Very dark, almost black jackals (said to be not uncommon in N. India) are quite rare in the peninsula, but occur in the south-west. Animals almost entirely tawny are also seen occasionally.

*Distribution*

All over the peninsula : commoner around forest-side villages than in forests.

*Habits : Behaviour*

A great deal has been written about jackals as scavengers and as the camp-followers of tigers. It is significant that the 'pheal' of Anglo-Indian shikar literature is said to attach itself to tigers and not to leopards—the latter prey on jackals.

Jackals living along the coastline are much given to hunting crabs at night along the foreshore (TN 68 Dec. 12). Apart from feeding on carrion when it is available, they hunt whatever they can overcome, from field mice to the fawns of chital. When hunting larger prey, sometimes they may run in a pack, but usually they hunt alone. Among the fruits eaten are ripe mangoes, the ripe drupes of the lantana, and *Zizyphus mauritiana*.

At sunset jackals usually come out with a concerted howling, one animal starting the howling which is taken up by others near it. The purpose of this vocalisation is not clear, but it is probably an assembly call. This evening chorus of jackals, once one of the most familiar sounds of the Indian countryside, is no longer to be heard in many of the areas where it was common. No doubt the occupation of the plains country by humanity is partly responsible for this, but since this chorus is mainly a feature of jackals living around human settlements, this cannot be the explanation of the decline of the familiar noise.

## THE DHOLE OR THE WILD DOG

*Cuon alpinus* (Pallas)

(Summary of field notes : Observation records : 25.

*Locations* : Kerala—Periyar Sa. : Tamil Nadu—Mudumalai Sa. : Mysore—Bandipur Sa. : Madhya Pradesh—Kanha N.P. : Maharashtra—Taroba N.P.

*Photographs* : K 28 MY 11.)

The history of human hostility to the wild dog in India during the present century is both interesting and significant, as showing a strong biotic bias that is independent of cause-and-effect reasoning, motivated largely by unverified prejudice, and sentiment. No other animal has incurred the antagonism of man without doing him any demonstrable harm. No instances are on record of wild dogs having killed or injured men in the many brushes between them ; though they have been known to kill cattle on occasion, these killings are so few and far between that they may be ignored and, moreover, have never been cited as a reason for outlawing the predator and, being a thoroughgoing carnivore wild dogs have never done any harm to crops. Moreover, being a comparatively small animal whose head provides no worthwhile trophy and whose pelage loses its lustre with death, it has never been considered a game animal. But still there has been a reward on the head (and brush) of the wild dog till recent times and even today the dominant impulse of men with guns on seeing the animal is to shoot it.

Only one justification has been adduced for this implacable hostility and it is valuable in its way as showing the sustained and ubiquitous interest of men in hunting the very animals that the wild dog hunts, especially deer—it is a hostility sustained by a sense of competition. Hunters proceeding to some area noted for its game, to shoot, have found the game animals wary, elusive, and scattered, and have attributed this scarcity and vigilance to the earlier visit of wild dogs to the area. In this they are probably less correct than they think. If, as it is repeatedly asserted in shikar literature, all the deer and other herbivores at once abandon their homes and shift the moment wild dogs appear in their area (presumably to near-by areas where they are safe from wild dogs) it is difficult to understand how the wild dogs are able to find prey or why they (among the most persistent followers of scent trails) do not follow their retreating prey.

And it is not as if these sportsmen did not know two highly relevant aspects of this question, first the fact that wild dogs and their prey are often found in the same area and second that for thousands of years the two had coexisted without the prey species having died out.

There are records of sportsmen having seen wild dogs lolling on the ground in plain view of chital and sambar which just ignored them, since the dhole were not hunting. To provide reason for raising the government reward on the head of wild dogs, Glasfurd puts forward the theory that they have suddenly increased in numbers. The periodic fluctuations in the wild dog population of an area, the apparent sudden increase and subsequent sudden decrease, which cannot be adequately explained entirely by influx and efflux but is also caused by actual increase and decrease in numbers, has been selectively cited to show that these 'vermin' should be sternly put down. The role of wild dogs in main-



taining the balance of nature has been consistently ignored, though F. W. Champion makes out a weak case for them. The truth seems to be that human hostility to the wild dog is largely based on compassion for their victims, on the ruthless and piecemeal killing methods of the predators, which being small compared to their prey are sometimes unable to kill them swiftly, though they do attack in numbers and pull down and kill the prey quickly quite often.

*Size : Morphological characters*

Size and even colour vary somewhat with locality and individuals. A comprehensive account of the appearance and other characteristics of the dhole is provided in a note by Col. R. W. Burton (*JBNHS* 41 (4) : 691-715) which sums up most of the information available up to 1940. Generally speaking, the dhole is from 17 to 22 inches in height and from 30 to 45 lb. in weight, with what dog-fanciers term a red coat : the brush, carried below the level of the back, has a terminal tuft of long black hair, sometimes with a core and tip of white hair. In an old dog, the back may be dark and grizzled, very much in the patterning of a jackal's back (TN 63 Sep. 30) : a little white may be found on the toes, or on the chest or throat (MP 69 Mar. 14). In profile the face is somewhat downfaced, and the muzzle deep, both characteristics shared by no breed of Indian domesticated dog.

The genus *Cuon* is distinguished from *Canis* (the genus of the wolf, the jackal, and all domesticated dogs) mainly by there being one molar less on each side in the lower jaw, and the bitch having about 14 teats instead of 10. The close resemblance of the dhole to red-coated countryside dogs (red, warm sienna and brown are the colour of countryside dogs of unmixed blood, termed 'pariah' by canine experts) has been remarked by many observers. Forsyth (*THE HIGHLANDS OF CENTRAL INDIA*) was confused by the similarity of the tribal pariah dogs of the Upper Narmada forests to the dhole, and thought those dogs were descended from the latter. Burton, arguing the case further in his note, says that jackals have been known to interbreed with the dhole, and also with domesticated dogs, and cites the instance of 'a wild dog bitch with her two pups, sired by a jackal in the Mysore Zoo in November 1930', and sees no reason why interbreeding between dhole and domesticated dogs should not result in a breed of red-coated domesticated dogs. Apparently the extreme likelihood of the progeny of such far-fetched matings being infertile was not considered by him. In view of the taxonomists being almost certainly entirely correct in their separation of the genus *Cuon* from *Canis*, the name 'wild dog' seems a misnomer for *Cuon alpinus* and it seems advisable to adopt the other vulgar English name (derived from Indian languages) and term this animal 'dhole' : the desirability of keeping such derived names (gaur, langur

and barasingha provide other examples) pure by interpreting them to include the plural as well as the singular (as they include in the Indian languages from which they are derived) may also be mentioned here.

### *Distribution*

Within peninsular India, the dhole is essentially a forest animal, and is not found in open country.

### *Habits : Behaviour*

A great deal has been written about the destructiveness of the dhole, and also its method of hunting. Although usually running in packs and parties, it may also hunt alone, as when breeding, and at such times it is probably looking for small, easily available prey, such as hares and field rats, though it can pull down a chital hind or a small pig single-handed. A single male was observed regularly quartering an extensive patch of scrub at an easy run, with its head held high, scanning the ground in front of it ; occasionally it took a high jump to look over the bushes limiting its vision (TN 62 Sept. 26). Packs usually go for large animals, such as chital, sambar or pig. Although it is known to kill cattle (especially young animals) once in a way, inquiry of the herdsmen in the Tamil Nadu and Mysore forests around the river Moyar, where cattle are grazed in thousands and dhole are common, elicited the information that as predators affecting cattle they were negligible : one such inquiry was made in Bandipur (MY 68 Oct. 7). Most of the accounts of dhole hunting go to show that they follow fast-running prey, usually much larger than themselves, relentlessly by ground scent, tiring their quarry out in the course of a long run and then, having practically run it to a standstill, tear it down piecemeal. No doubt they do hunt in this manner, where the ground favours such hunting, but more often the run is short, only about half-a-mile or so, and the quarry is in plain view all the time. I have observed two such killings, and one of them is mentioned in the field notes (TN 63 Sep. 30). In this instance, three or four of the pack came out to the scene of the kill in advance, before the rest of the pack stampeded a large herd of chital, and drove a section of the herd across a hollow on to comparatively open ground, the outlying sentries preventing the deer from escaping to bush and tree forest beyond. Having cut off one animal (a young stag with antlers just shed) the dhole concentrated on it (though one of them also chased a hind, on its own, the hind escaping), taking advantage of its curved line of flight to get near it by short-cuts. Then one of them launched an all-out attack, a frenzied, flat-out scurry for the bite, with its effort punctuated by its rasping intakes of breath ; when it failed, it fell back and at once the attack was taken up by another dhole. There is no attempt to pull down the quarry in such attacks, but only to snatch at it, the



momentum of the much heavier prey serving no less than the jaw-power of the dhole to tear out a chunk of flesh and hide. A big stag at bay, with its back so protected by some natural feature that an attack from the rear is not possible, may probably be able to fend off the attackers with its antlers : in such a case, the dhole give up the hunt, or much more usually just surround the prey and wait, and when the tension of the situation causes the deer to break away and attempt escape by flight, it is once more exposed to attack.

Dunbar Brander says that dhole seldom hunt at night. This seems substantially true, for sight seems to be every bit as important to them in hunting as scent : they keep in touch with the members of the pack following the quarry by means of high, whistling whines when pursuing the prey through obscuring bush cover, and kill it only in comparatively open ground, guiding their attack by sight. However, hunts at night have been recorded and F. W. Champion has a night-photograph showing some dhole smelling the ground : they are active by night as well.

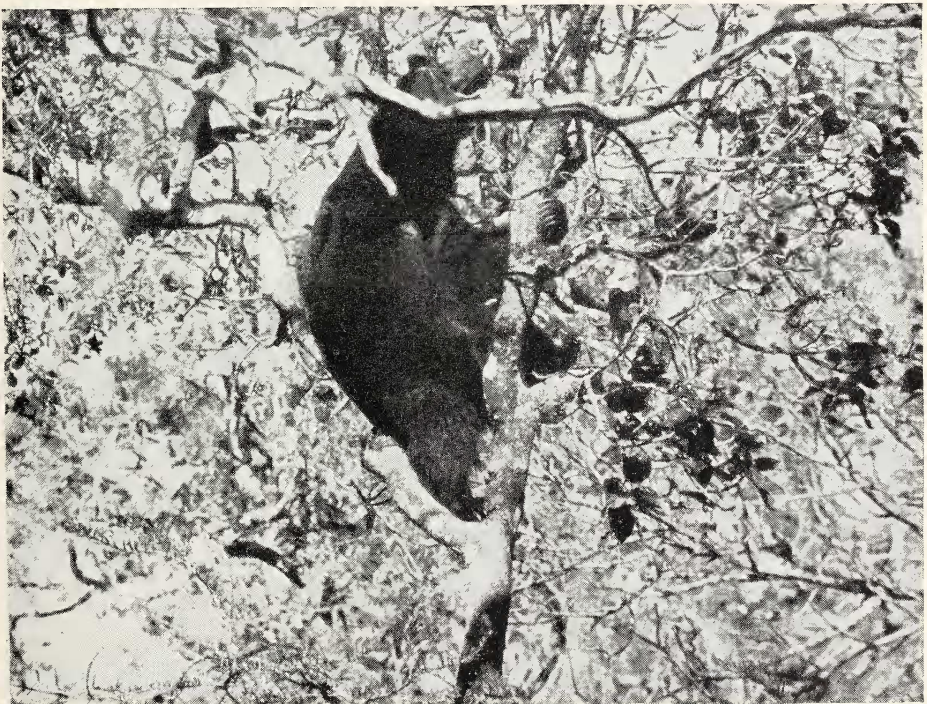
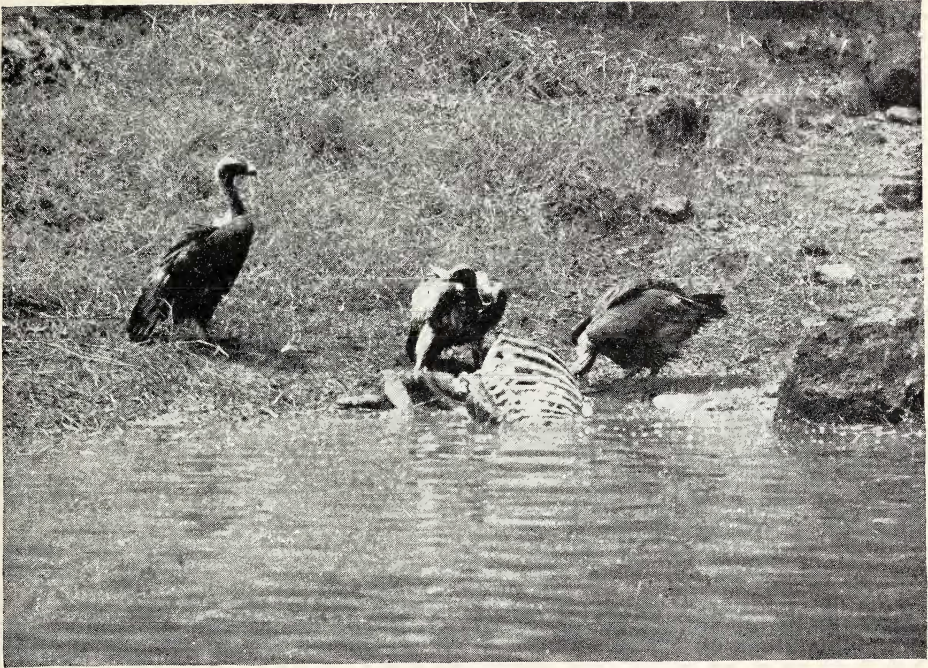
Dunbar Brander says he has never known them remove the stomach and intestines from a kill, and that kills from which these had been removed were probably the property of a leopard, misappropriated by dhole. In both the kills actually witnessed, one of a sambar hind killed right in front of my eyes in the course of a run over 100 yards (this is not recorded in the field notes) and the other of a chital stag which I saw being chased, heard being killed, and a few minutes later saw as a half-devoured kill, the guts had been removed as also the tail, and both flung feet from the body (TN 63 Sep. 30). In his note, Burton relying on Inverarity says that the eyes are invariably consumed at once (if not torn out earlier) as soon as the kill is made. In both the instances of personal observation cited above, the eyes were untouched, though more than half the body had been eaten by the time I inspected the kill.

The vocalisations of this normally silent animal are discussed in Burton's note. Among the vocalisations I have heard are the well-known whistling whine when the dhole were pursuing prey in bush cover (MY 68 Oct. 14 ; TN 69 Oct. 4), evidently sounded by the animals nearest the quarry as a guide to the rest of the pack, a short, interrogative bark and a loud, unearthly cackling which served to reassemble scattered dhole (TN 63 Sep. 30). Dhole jump high to scan the surroundings, and also go up elevations to peer over the crest (MY 68 Oct. 22 : MP 69 Mar. 14).

Burton mentions the inability of a dhole to spot him, sitting in a machan above it, from his sounding a whistle and blowing on a signal horn, and from this says that the dhole (and some other animals) are not quick in spotting things well above the level of their normal preoccupation with the ground. My experience has been quite otherwise. Few animals are quicker at pinpointing even slight sounds even from a treetop seat (MY 69 Oct. 21).



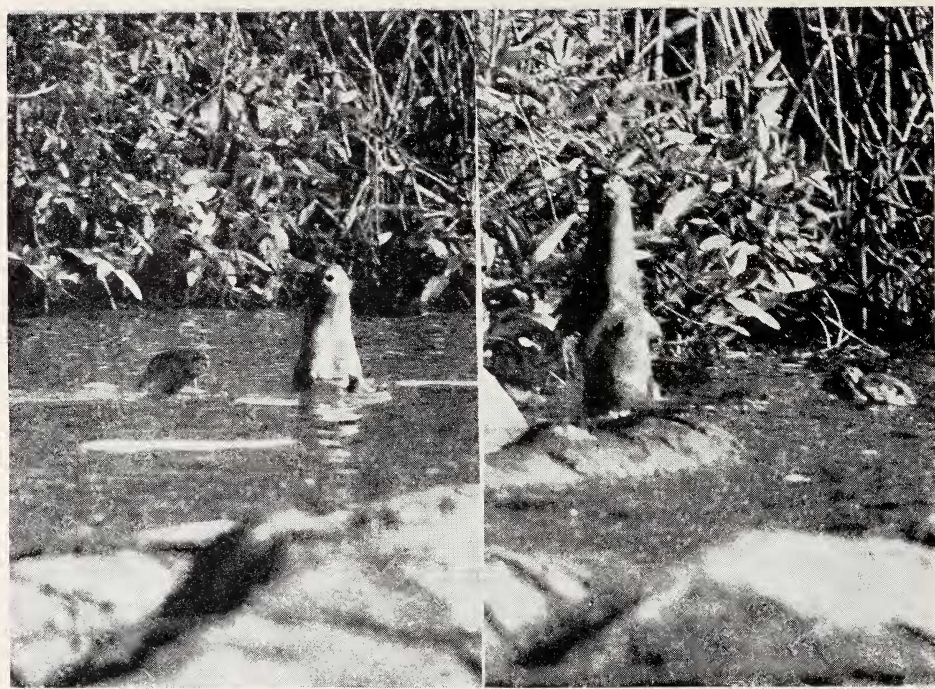
Krishnan : Mammals



*Above* : KERALA 1960 : PERIYAR SA. : April 17 — p.m. : Vultures feeding on a wild dog kill : (sambar) — K. 8 ; *Below* : TAMIL NADU 1962 : MUDUMALAI SA. : Kargudi : March 14 — a.m. Sloth bear eating mohwa flowers — TN. 9.  
(Photos : M. Krishnan)



Krishnan : Mammals



*Above* : KERALA 1959 : Quilon backwaters : June 1 — a.m. : Otters standing up in the water to look and hiss at me — K. 1; *Below* : TAMIL NADU 1963 : MUDUMALAI SA. : Kargudi : March 20 — a.m. : Large Brown Flying Squirrel gliding — TN. 23.  
(Photos : M. Krishnan)